MEAT PRODUCTION IN AUSTRALIA AND NEW ZEALAND.

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INTRODUCTORY.

EARLY in 1913 importations into the United States of frozen and canned meats from Australia and New Zealand began to show a marked increase. In past years the large surplus of mutton and beef produced in the Australian colonies has found its principal market in England, with smaller shipments going to continental Europe and the islands of the Pacific Ocean. However, with the steady increase in the population in the United States and at the same time the rather marked decrease in the number of beef cattle produced, especially during the past six years, it was inevitable that part of the world's surplus of meat, particularly beef, produced in the vast pastoral regions of South America and the Australasian countries should begin to seek North American markets.

In view of the volume of meat entering United States ports from Australia and New Zealand, the writer was directed by the Secretary of Agriculture late in the summer of 1913 to proceed to those countries and examine into the conditions under which the meat and meat food products intended for entry into the United States are produced, slaughtered, treated, and shipped.

Owing to the vast area of Australia, which is approximately equal to that of the United States, not including Alaska or the island possessions, it was possible to visit only the principal live-stock districts of the States of South Australia, Victoria, New South Wales, and Queensland lying to the eastward and bordering on the Pacific Ocean. However, in this portion of the continent are situated the principal cattle and sheep raising regions, and it is in this part of the Commonwealth that practically all of the Australian meat-export works are located. New Zealand, consisting mainly of two islands each approximately the size of the State of Iowa and situated about 1,200 miles to the east and south of Australia, was visited upon the conclusion of the observations made in Australia.

PRODUCTION OF LIVE STOCK.

The relative importance of Australia and New Zealand as sheep and cattle producing countries of the world will be noted in the following tables, showing the number of sheep and cattle of various countries. More detailed information on this subject can be found in the appendix to this volume.

Number of cattle in various countries.

Country.	Date.	Number.	Country.	Date.	Number.
British India	1911	114,876,000	Sweden	1911	2,690,000
United States	1913	56,527,000	Roumania	1911	2,667,000
Russian Empire	1910	51,404,000	Spain	1912	2,562,000
Argentina	1911	28,786,000	Denmark	1909	2,254,000
Germany	1912	20,182,000	Netherlands	1910	2,027,000
Austria-Hungary	1911	17,188,000	New Zealand	1910	2,020,000
France	1912	14,706,000	Bulgaria	1911	2,018,000
United Kingdom	1913	11,869,000	Belgium	1912	1,831,000
Australia	1912	11,577,000	Chile	1912	1,760,000
Uruguay	1908	8,193,000	Ceylon	1910	1,465,000
Canada	1913	6,656,000	Switzerland	1911	1,443,000
Italy	1908	6,199,000	Japan	1912	1,399,000
Mexico	1902	5,142,000	Algeria	1911	1,114,000
Cape Colony	1911	2,716,000	Norway	1907	1,393,000

Number of sheep in various countries.

Country.	Date.	Number.	Country.	Date.	Number.
Australia	1912	83,263,000	Italy	1908	11,163,000
Russian Empire	1910	80,500,000	British East Africa	1912	6,500,000
Argentina	1911	80,401,000	Roumania	1911	5,269,000
United States	1913	51,482,000	Chile	1912	4,169,000
British India	1911	31,691,000	Servia	1905	3,809,000
United Kingdom	1911	27,824,000	Mexico	1902	3,424,000
Uruguay	1908	26,286,000	Transvaal	1911	3,415,000
New Zealand	1913	24,192,000	Canada	1913	2,129,000
Cape Colony	1911	17,135,000	Natal	1911	1,519,000
France	1912	16,468,000	Norway	1907	1,393,000
Spain	1912	15,830,000	Sweden	1909	1,021,000
Austria-Hungary	1911	13,477,000			

Stock raising comprises the leading industry in both Australia and New Zealand, the former exceeding all other countries in the number of sheep and the amount of wool exported. Settled largely by thrifty English and Scotch emigrants during the past century, it naturally followed that

the painstaking and economical methods of animal husbandry and agriculture pursued in the parent country should be adopted and followed, so far as practicable, by the colonists of Australia and New Zealand. The best types of English and European breeds of sheep and cattle were early brought to the colonies. The results of these early importations, supplemented by later importations, formed the basis for the present flocks and herds. In fact, the breeding of sheep in these two countries has progressed along such sound, careful lines that other countries, recognizing the perfection of certain strains, are now importing Australian and New Zealand stud sheep.

Sheep raising is preeminent in both colonies, although Australia also produces a large quantity of beef for export. In Australia, where the production of wool rather than mutton has been in the past the chief aim of sheepmen, the Merino or fine-wool type of sheep predominates. In New Zealand considerable attention has been given to the breeding of sheep for meat production, with the result that trade reports show the Downs, Romney, Leicester, and Lincoln lamb carcasses of New Zealand are highly regarded in the European market for their excellent qualities.

The table below shows the stocks of domestic food animals in Australia and New Zealand from 1901 to 1912, the figures being those published in official reports of the respective countries:

Number of domestic food animals in Australia and New Zealand, 1901 to 1912.

Year.	Australia.			New Zealand.		
	Cattle.	Sheep.	Swine.	Cattle.	Sheep.	Swine.
1901	8,491,428	72,040,211	931,309	1,361,784	20,233,099	224,024
1902	7,062,742	53,668,347	777,289	1,460,663	20,342,727	193,740
1903	7,247,508	56,932,705	837,368	1,593,547	18,954,553	226,591
1904	7,840,520	65,823,918	1,062,703	1,736,850	18,280,806	255,320
1905	8,525,025	74,403,704	1,014,853	1,810,936	19,130,875	249,727
1906	9,349,409	83,687,655	813,569	1,851,750	20,108,471	242,273
1907	10,128,486	87,650,263	754,101	1,816,299	20,983,772	241,128
1908	10,547,679	87,043,266	695,689	1,773,326	22,449,053	245,092
1909	11,040,391	91,676,281	765,137	.....	23,480,707	.....
1910	11,744,714	92,047,015	1,025,850	2,020,171	24,269,620	348,754
1911	11,828,954	93,003,521	1,110,721	.....	23,996,126	.....
1912	11,577,259	83,263,686	845,255	.....	23,750,153	.....

In Australia the vast sloping highlands and plains country of the great interior of the continent, where the precipitation is sufficient to produce vegetation, is almost wholly devoted to live-stock grazing. The system mostly followed in the range country is to inclose in fence large holdings of land which are either privately owned or leased for a term of years from the Government. These ranches are known as cattle and sheep stations, and range in size from 5,000 to several million acres. Owing to the prevailing tropical and subtropical climate of Australia, open grazing on the indigenous grasses extends throughout the year in ordinary seasons. Practically no effort is made in these continuous-grazing districts to provide feed for periods when grass becomes deficient on account of drought, and devastating sectional or even general droughts are of not infrequent occurrence. These dry periods often seriously affect the live-stock industry by causing considerable losses of lambs and calves, and at times enormous losses of cattle and sheep. Thus, in the prolonged drought extending from 1898 to 1902 official reports show decreases in the number of sheep and cattle within the Commonwealth as follows:

Decrease of live stock in Australia owing to four years' drought.

	Number in country.		Decrease.	
	1898.	1902.	Total.	Per cent.
Sheep	79,000,000	54,000,000	25,000,000	31.63
Cattle	10,400,000	7,000,000	3,400,000	32.69

Following the droughts, however, the live-stock industry shows remarkable recuperative powers and a few favorable seasons usually suffice for a replenishment of the depleted flocks and herds. Thus, in the nine years following the 1898–1902 drought the number of sheep increased a little more than 38,000,000, while cattle increased not quite 5,000,000. Australia is poorly supplied with natural water courses, so that much dependence must be placed in ponds constructed to impound surface water or in bores or wells, which are often 3,000 feet or more in depth.

Although scarcely eight decades have passed since actual settlement began, New Zealand may now be considered one of the leading countries in the production of mutton, wool, and dairy products of good quality for export. The Government, recognizing the natural resources available for pastoral pursuits, has lent considerable encouragement and aid in developing the live-stock industry by fostering the raising of sheep and dairy cattle in the Dominion, by searching out and opening up new markets, granting subsidies to steamship companies carrying New Zealand products to foreign ports, etc. Sheep farming on a moderate scale is a leading agricultural pursuit in New Zealand; that is, small or large flocks of sheep are raised on a majority of the farms, on which the pastures are supplemented to a large degree by root crops, kale, rape, etc. The practice is quite common to finish fat lambs for market on succulent field crops, with the result that prime carcasses for export are produced.

The production of swine in both colonies is conducted largely as an adjunct to dairying, the combined annual stocks totaling less than 1,500,000 swine.

MARKETING OF LIVE STOCK.

The marketing of fat stock is conducted along much the same general lines in both countries. Buyers may go to the premises to make direct purchases of the producers, or the producers or owners may offer their holdings at public auction at salesyards located in various towns and districts. Such auction sales may be held at certain places on regular days each week, or announcements may be made in advance in the local newspapers. Live-stock sales are usually made at a lump price per head, or, in case of private sale, they may be made on the basis of the dressed weight of the carcass at the meat works. The practice of weighing live stock at the time of sale is not followed, it is said, except occasionally in the purchase of swine.

In Australia fairly large public salesyards are maintained in the cities of Sydney, Melbourne, Adelaide, and Brisbane for the purpose of marketing fat live stock. The Flemington cattle and sheep salesyards at Sydney, New South Wales, are the largest in Australasia. At these yards usually but two

sales days per week are held, the weekly receipts averaging about 5,000 cattle and 30,000 sheep. Swine salesyards are maintained in another part of the city, the weekly receipts averaging approximately 2,000 head. The system of marketing cattle, sheep, and swine in these large salesyards is to offer the live stock at public auction in pen lots or smaller groups, or even singly, as the live-stock agent sees fit. The tenders of purchase are made in lump sums per head, which renders the weighing of the animals unnecessary upon consummation of sale.

The custom of slaughtering on farmers' account is being followed to some extent in both countries, but more commonly in New Zealand. Under this method the slaughtering concern undertakes to receive cattle and sheep, to slaughter, freeze, and market the carcasses, and dispose of the skins, tallow, etc., for the farmer or owner, charging variable fees for the services rendered. Also several of the large meat-export works in New Zealand are owned and operated by cooperative associations of farmers or stock owners, by which plan such profits as may accrue in the conduct of the association are returned directly to the members whose live stock were slaughtered and marketed by the works. These cooperative concerns seem to be conducted along sound business lines and report making reasonable returns to live-stock owners during the past few years. An illustration of one of these cooperative establishments is seen in Plate XLII, figure 1.

TRANSPORTATION OF LIVE STOCK TO MEAT WORKS.

Although Australia has an area approximately equal to that of the main body of the United States, it has a little less than a total of 17,000 miles of railways, all owned by the Government. Railroad development has been confined mostly to the southeastern and eastern parts of the continent, thus leaving the vast interior and the western and northern parts of the country without connecting railroads. This means that sheep and cattle produced on the interior expanse of grazing land must be driven on foot to distant railway points for shipment or driven direct to the meat works, the latter being quite uniformly located on or near the Pacific coast between Adelaide, South Australia, on the south, and Townsville, Queensland, on the north. It is not uncommon

in Australia to hear of large droves of fat cattle which have been driven overland from 500 to 1,000 miles or more, subsisting without serious loss of weight on native grasses along the way, to reach a railway shipping point or meat works. Likewise, sheep from the far interior districts are often trailed hundreds of miles to reach market. Railway live-stock cars or trucks are much smaller as a rule and more open in general construction than American stock cars, some being arranged without roofs.

The two main islands of New Zealand, which virtually lie end to end and have a combined length of about 1,000 miles, sustain a total railway mileage of about 2,800 miles. As in Australia, all railroads are Government-owned. Owing to the New Zealand railroads being narrow gauge (3 ft. 6 in. between rails), the running equipment is of necessity light. The apparent inadequacy of the present railways precludes, practically, if such were desirable, the establishment of large central live-stock markets with associated slaughtering works. Instead, meat-export slaughtering works, usually one or two in each district, are located throughout the entire length of the eastern coast of both islands. The supplies of sheep and cattle for these meat works are usually obtained in the territory contiguous to the meat works located in that district. By arrangement, refrigerator steamships call at the various New Zealand ports where meat works are located to take on consignments of frozen meat, tallow, skins, etc., direct for British or European markets. From this it will be readily seen that railroad haulage does not enter to a large extent into the marketing of fat live stock or the shipment of meat in New Zealand.

LOCATION OF MEAT-EXPORT WORKS.

In Australia practically all of the meat-export works are located in the eastern and southeastern coastal regions. The principal slaughtering and shipping points are as follows: Adelaide, South Australia, exporting frozen lamb, mutton, and small amounts of beef and canned meats; Melbourne, Victoria, exporting frozen lamb, mutton, and some beef and canned meats; Sydney and Newcastle, New South Wales, exporting frozen lamb, mutton, and beef, canned meats, and meat extracts. More sheep are slaughtered at or near Sydney

and Newcastle, and more frozen mutton is exported through these ports, than from any other single State in Australia. Meat-export works in Queensland are located at or near the ports of Brisbane, Gladstone, Rockhampton, Bowen, and Townsville, and they supply more than one-half of the frozen beef exported from Australia. In addition, Queensland exports through these same ports considerable quantities of frozen mutton, canned meats, meat extracts, and tallow.

In New Zealand, with the exception of five or six meat-export works in the western part of North Island, all of the establishments for slaughtering and freezing meat for export are scattered along the east coast of both islands, extending from the northern to the southern extremities. The principal ports of export are Auckland, Gisborne, Napier, Wellington, Wanganui, and Waitara in North Island, and Nelson, Picton, Lyttleton, Timaru, Omaru, Dunedin, and Bluff in South Island.

TYPE OF MEAT-EXPORT WORKS.

In general, slaughtering departments of Australian and New Zealand meat-export works are confined to buildings of one or two stories in height. Slaughtering rooms as a rule are arranged with sufficient hanging space either in the room itself or in a well-ventilated room close by where freshly dressed carcasses of sheep and cattle are allowed to hang on rails for several hours for the purpose of cooling at atmospheric temperature. This space for cooling carcasses usually adjoins the freezing compartments in order that the carcasses when sufficiently cooled can be conveyed directly into the freezing rooms. The freezing and storage chambers are arranged along the general lines usual in such structures, being ordinarily divided into several large compartments, usually two stories in height, with freezing chambers above and compartments below for the storage of solidly frozen carcasses while awaiting shipment. Refrigerator capacity is usually provided to store from 20 to 30 days' slaughtering output. In Plate XLII, figure 2, is seen a view of a Queensland meat-export works, showing the Australian method of drying sheepskins in the sun on wire trellises.

In Australia, owing largely to the tropical and subtropical climate, the buildings used for meat works are as much as possible left open on the sides to permit free circulation of air.

These buildings are usually constructed with a framework of wood, with sides and roof covered with corrugated sheet iron. That part of the works, however, used for refrigerator purposes is usually constructed of wood or brick. Floors of slaughtering compartments are largely constructed of cement, asphalt, brick, or native hardwood. To secure an adequate supply of potable water for use at meat works seems to be a serious problem at many of the Australian works visited, as certain parts of Australia are deficient in natural watercourses and subterranean water can be reached only at great depths in some localities.

In New Zealand the better meat works are constructed of brick, a few of concrete, and others of wood. However, corrugated sheet iron is quite generally used for inclosing the sides of meat-works buildings and is used almost wholly for roofing purposes. Slaughtering floors are constructed of cement, asphalt, or brick. Louver windows to provide ample ventilation are provided in slaughtering rooms and in rooms used for the atmospheric cooling of fresh carcasses. New Zealand is bountifully supplied with clean, wholesome water, so that all meat works are excellently provided for in this respect.

MEAT-INSPECTION LAWS AND REGULATIONS.

AUSTRALIA.

Federal inspection of meat intended for exportation is provided by the Commonwealth commerce (trade descriptions) act of 1905 and is conducted under the direction of the minister of trades and customs, who is empowered to make rules and regulations governing the conduct of inspection. The federal comptroller general of customs, Mr. Stephen Mills, is the directing head of the Commonwealth meat-inspection service. The regulations and instructions issued by the department of trades and customs governing the inspection and exportation of meat and meat food products require an ante-mortem and post-mortem examination at the time of slaughter of all cattle, sheep, swine, and goats, the meat or products of which are intended for export shipment. Supervision is also extended to the preparation of canned meats, extracts, etc. Department officers are empowered to grade meat as to quality when offered for export and may reject all carcasses not considered in a fat prime condition or those

showing faulty dressing or other conditions objectionable to the trade. Fees for inspection are charged and collected by collectors of customs at the time the meat is exported as follows:.

Beef and veal	per carcass	3d. (about 6 cents)
Pigs	per carcass	1d. (about 2 cents)
Lambs, sheep, and goats	per carcass	¼d. (about ½ cent)
Canned, preserved, piece, and other meat	per 100 lbs	½d. (about 1 cent)

NEW ZEALAND.

Under the "Slaughtering and inspection act of 1908" the Federal Government has provided for the inspection of all cattle, sheep, swine, and goats slaughtered for export, and for a similar inspection of all animals slaughtered for domestic consumption in municipalities of more than 2,000 inhabitants. The main features of the present law are:

(1) Federal inspection at all meat-export works.
(2) Federal inspection of meats for consumption in towns and cities of more than 2,000 people.
(3) Issuance of annual licenses for all slaughterhouses and meat-export works.
(4) Collecting fees from slaughterers to defray the cost of inspection.
(5) Remuneration for carcasses condemned.
(6) Government loans to municipalities to erect abattoirs.

Fees are charged by the Government in connection with the slaughter and inspection act as follows:

	£	s.	d.	
For registration of municipal abattoirs	5	0	0	(about $25.00)
Annual license to meat-export works	1	0	0	(about $5.00)
Annual license to slaughterhouse other than abattoirs and meat-export works	0	10	0	(about $2.50)
Inspection fees:				
Cattle per head			4d.	(about 8 cents)
For every 12 or fraction of 12 calves, pigs, or sheep			3d.	(about 6 cents)

The meat inspection of New Zealand is administered by the live stock and meat division of the department of agriculture, industries, and commerce, the chief of the service being a veterinarian, Dr. C. J. Reakes.

TRANSPORTATION OF EXPORT MEAT.

Although the meat-export works of Australia and New Zealand are located at or near the ports of export, few of the works are arranged so that frozen meat can be loaded

directly from the establishment into the ship's hold. Frozen meat is usually conveyed from the meat works or cold-storage plants to the ship's side by wagon, motor truck, insulated railway cars, or barges. It is then transferred into the hold of the vessel, and with as little delay as possible packed tightly into the refrigerator compartments. It was stated that the frozen meat is carried at a temperature ranging from 10° to 15° F. during the oversea voyage. While there is a large fleet of freighters conveying frozen-meat cargoes from Australasian ports to the United Kingdom, continental Europe, and the Far East, there are but three steamship lines equipped with refrigerator compartments operating between Australia and New Zealand and the Pacific coast of North America.

Steamships equipped with refrigeration plying between Australia and New Zealand and United States and Canada.

Name.	Route.	Steamers.	Refrigerator capacity.
			Pounds.
Oceanic Steamship Co. (San Francisco).	San Francisco and Sydney.....	Sonoma.....	400,000
		Ventura.....	400,000
Union Steamship Co. (Dunedin, New Zealand).	Sydney, Wellington, and San Francisco.	Tahiti.....	700,000
		Aurangi.....	250,000
		Moana.....	360,000
Royal Mail Line (Dunedin, New Zealand).	Auckland, Sydney, and Vancouver, British Columbia.	Niagara.....	1,456,000
		Makura.....	1,164,000
		Marama.....	1,164,000

Freight rates on frozen meats from Sydney, Wellington, or Auckland to San Francisco or Vancouver, British Columbia, at the time of the writer's visit, were ¾d. (about 1½ cents) per pound. Freight rates from Australia and New Zealand to London were quoted as follows:

Frozen beef in quarters or primal parts..per pound.. $\frac{9}{16}$d. (about 1⅛ cents)
Frozen sheep carcasses.....per pound.. $\frac{5}{8}$d. (about 1¼ cents)

EXPORT MEAT TRADE OF AUSTRALIA AND NEW ZEALAND.

The following statements, compiled from official reports, show the extent of the export trade of Australia and New Zealand in food animals and meat. The first statement gives the annual totals for each item since 1901. In order to convey an idea as to the destination of these exports the

second statement is presented, which gives the distribution of the meat exports from Australia for 1913. The distribution for New Zealand is not given because practically the entire trade of that country in meat is confined to the United Kingdom.

Australia's beef exports have increased rapidly in recent years, and while the United Kingdom gets the bulk of the trade, considerable shipments are widely distributed among other places, and there is at present a prospect of large dealings with the Pacific ports of the United States. Australian mutton is quite widely distributed also, although to a less extent than the beef.

Exports of domestic food animals and meat from Australia and New Zealand, 1901 to 1913.

AUSTRALIA.

Year.	Cattle.	Sheep.	Swine.	Beef.	Mutton and lamb.	Pork.	Bacon and ham.	Canned meat.
	No.	*No.*	*No.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1901.....	2,413	12,094	164	90,706,344	54,175,093	313,824	285,247	25,882,526
1902.....	4,489	24,296	31	79,453,248	44,105,600	647,920	187,739	21,989,644
1903.....	939	18,111	77	61,173,530	35,753,124	277,310	223,930	11,009,277
1904.....	770	7,746	247	37,090,945	47,863,532	420,783	369,083	15,702,031
1905.....	1,280	12,090	322	43,525,086	86,858,344	2,824,016	484,616	13,454,545
1906.....	552	17,979	220	41,561,252	90,692,385	3,472,224	530,459	9,060,903
1907.....	687	11,290	185	52,050,592	109,227,757	1,446,758	415,251	8,208,711
1908.....	953	13,019	117	40,711,516	91,607,614	826,102	389,718	12,383,939
1909.....	975	5,315	229	71,142,295	116,915,639	394,559	396,342	23,301,198
1910.....	3,745	13,144	303	109,427,528	190,229,330	741,410	1,604,362	34,053,451
1911.....	9,964	24,198	385	108,786,417	129,569,295	1,641,013	2,338,299	40,768,074
1912.....	16,083	34,101	609	142,210,076	115,371,981	897,929	2,172,880	34,161,615
1913.....	15,118	41,759	440	218,918,606	204,931,783	215,175	1,846,966	52,124,461
				NEW ZEALAND.				
1901.....	290	3,668	75	25,614,176	167,902,784	477,680	616,000	3,948,896
1902.....	3,062	48,047	326	33,006,624	191,378,656	469,516	661,920	6,078,352
1903.....	366	21,047	266	23,812,320	228,424,000	370,384	422,152	4,216,800
1904.....	480	7,430	323	20,116,992	182,157,472	396,704	187,152	2,552,226
1905.....	595	11,729	288	17,417,904	162,841,392	290,752	140,224	3,186,368
1906.....	477	13,324	254	29,187,648	187,600,448	583,184	142,016	4,501,504
1907.....	322	13,762	248	41,399,680	208,862,192	793,632	171,804	5,290,728
1908.....	183	6,136	271	40,108,208	186,991,840	172,480	221,998	3,619,952
1909.....	299	6,987	630	56,011,872	222,726,000	137,536	152,668	6,546,400
1910.....	227	6,335	729	58,390,080	227,865,344	1,232,784	198,738	7,002,240
1911.....	371	7,909	696	28,438,592	211,595,216	1,223,376	227,920	6,393,536
1912.....	379	6,475	510	31,716,496	248,569,104	128,352	281,892	4,871,116
1913.....	273	11,803	198	31,404,016	246,362,928	284,928	114,240	4,094,048

FIG. 1.—A NEW ZEALAND COOPERATIVE MEAT-FREEZING PLANT OWNED BY FARMERS.

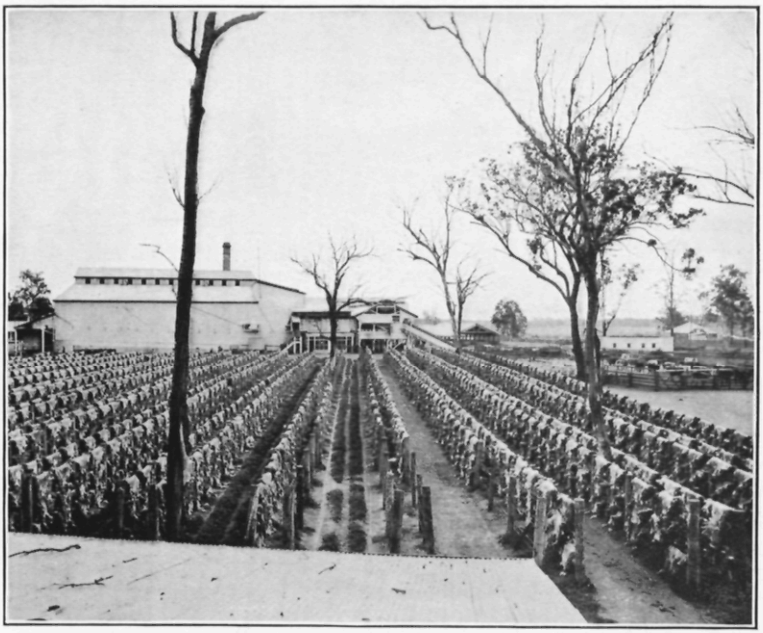

FIG. 2.—A QUEENSLAND MEAT-EXPORT WORKS, SHOWING METHOD OF DRYING SHEEPSKINS.

FIG. 1.—MUNICIPAL ABATTOIR AT AUCKLAND, NEW ZEALAND.
[Side view, showing railroad loading platform.]

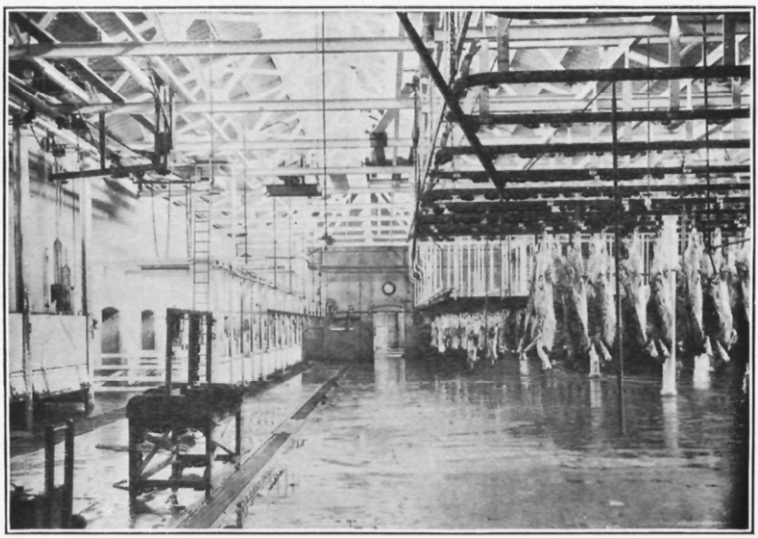

FIG. 2.—CATTLE AND SHEEP SLAUGHTERING ROOM, MUNICIPAL ABATTOIR, AUCKLAND, NEW ZEALAND.

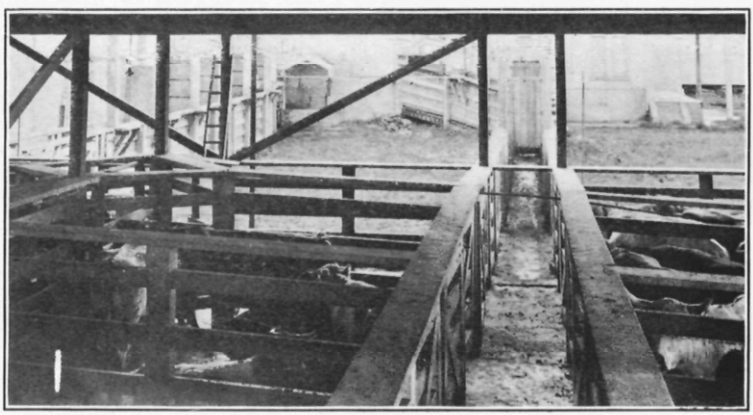

FIG. 3.—STOCK PENS AT MUNICIPAL ABATTOIR, AUCKLAND, NEW ZEALAND.

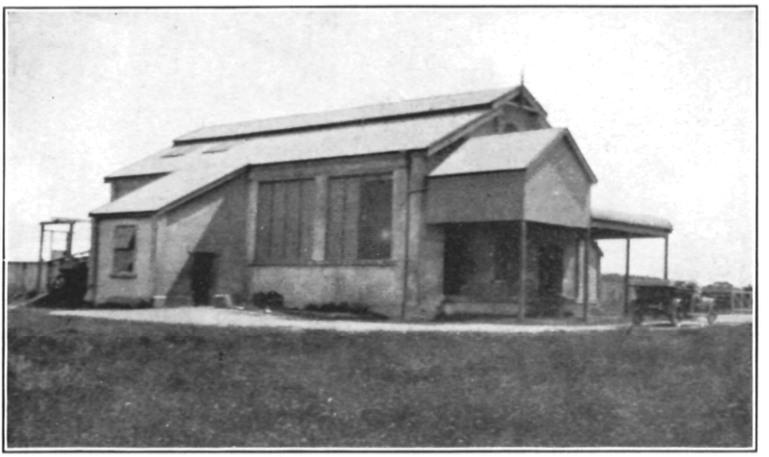

FIG. 1.—A MUNICIPAL ABATTOIR IN A SMALL NEW ZEALAND CITY.

FIG. 2.—GENERAL VIEW OF THE NEW STATE ABATTOIR AT SYDNEY, AUSTRALIA.

FIG. 1.—CORRIEDALE EWE HOGGETS, ABOUT 15 MONTHS OLD.

FIG. 2.—CORRIEDALE EWE HOGGET, ABOUT 15 MONTHS OLD, WITH LAMB.

The beef trade of New Zealand is small compared with that of Australia. It is remarkable, however, that whereas New Zealand has only about one-fourth as many sheep as Australia, the exports of mutton and lamb are in most years more than twice as large as those of the latter country. This trade is, in fact, now so highly developed in New Zealand that the number of carcasses annually shipped to England represent fully 25 per cent of the entire flocks of the Dominion.

Distribution of meat exports from Australia during 1913.

Country to which exported.	Beef.	Mutton and lamb.	Pork.	Bacon and ham.	Canned meat.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
United Kingdom	169,963,291	191,440,138	11,877	731,189	41,121,014
Italy	6,356,514	44,854	.....	.....	.....
France	349,418	51,238	.....	.....	924,504
Germany	1,813,799	5,144,062	.....	.....	165,000
Canada	3,352,675	1,662,910	.....	.....	215,820
United States	5,037,769	571,008	.....	.....	1,891,114
South African Union	5,656,346	1,550,257	.....	.....	1,599,119
Egypt	3,990,804	633,109	23,780	.....	.....
Malta	1,142,092	.....	.....	.....	.....
Philippine Islands	14,535,447	778,693	93,507	475,154	237,920
Hawaii	2,356,115	91,085	.....	.....	30,728
Japan	36,705	39	.....	.....	.....
Hongkong	423,659	401,380	.....	60,305	105,336
China	.....	.....	.....	54,523	202,186
Other countries	3,903,972	2,563,010	86,011	525,795	5,631,720
Total	218,918,606	204,931,783	215,175	1,846,966	52,124,461

In addition to the exportation of meat products of domestic food animals, Australia exports annually from 15,000,000 to 20,000,000 frozen rabbits and hares, and New Zealand furnishes for export annually between 2,000,000 and 4,000,000. The shipment of rabbit skins to Europe is also an important item in the export trade of the two countries.

PUBLIC ABATTOIRS.

An especially commendable feature in the domestic meat trade of Australia and New Zealand is the rather general operation of municipal and State-owned abattoirs. The people of Australasia are perhaps the greatest meat con-

sumers per capita of all civilized countries, and no little interest is displayed by the general public in the production of the meat offered for domestic consumption. In most places the public abattoir is regarded as a necessity both from the standpoint of public health and community economy.

The people of New Zealand have been especially progressive in the enactment of laws dealing with municipal-owned slaughterhouses. A Government statute passed a few years ago provides that when a municipality attains a population of 2,000 it shall within a specified time establish an abattoir for public use wherein all local slaughtering shall be conducted. It is also provided that all such municipal-owned abattoirs shall conform to the requirements of the Government with respect to location, construction, arrangement, water supply, drainage, etc., and that federal inspection shall be inaugurated in all such establishments, the cost of the inspection to the New Zealand Government being recovered in fixed fees charged slaughterers by the municipality. By this arrangement it will be observed that while it is incumbent on the municipal authorities of towns of more than 2,000 inhabitants to establish and operate public abattoirs for their respective cities, the sanitary control of all such abattoirs and the conduct of meat inspection rests wholly with the Federal authorities, which at once suggests the highest possible protection to human health as regards unsound or unfit meat. The municipal abattoirs visited in New Zealand were uniformly of sound sanitary construction and well ordered throughout. The largest municipal abattoirs in the Dominion are those at Auckland (see Plate XLIII) and Dunedin. The number of animals slaughtered monthly at those places was given as follows: Auckland, 1,500 cattle, 8,000 sheep, 1,000 swine; Dunedin, 1,000 cattle, 10,000 sheep, 300 swine.

The Auckland abattoir is stated to have cost, for the land (26 acres), buildings, etc., including residence of manager, approximately £40,000 ($200,000). A smaller abattoir is shown in Plate XLIV, figure 1.

Australia has no commonwealth law requiring the establishment of public abattoirs. However, most of the individual States have enacted statutes dealing with the estab-

lishment of municipal or State-owned abattoirs. Large public abattoirs owned and operated by the State of New South Wales have been maintained on Glebe Island at Sydney for the past 50 years or more. These works have been extended from time to time as necessity demanded until now their average daily slaughtering capacity is as follows: Cattle, 1,500; calves, 500; sheep, 3,000; swine, 600.

About four years ago the State of New South Wales began the erection of entirely new abattoirs at Homebush Bay, a suburb of Sydney (see Plate XLIV, fig. 2), with a view of abandoning the now more or less out of date works at Glebe Island. It was stated that the new State abattoirs would be opened for use within a few months with an estimated daily slaughtering capacity for the immediate future as follows: Cattle, 2,000; calves, 800; sheep, 15,000; swine, 1,000.

In connection with the Homebush abattoirs, there will also be operated by the State of New South Wales a public live-stock and sales yards, which when completed will cover an area of about 80 acres. The total outlay of the State for the Homebush abattoirs and stockyards, it is officially stated, will be approximately £500,000 (about $2,500,000).

At Adelaide, South Australia, the writer visited the large abattoirs and public stockyards owned and operated by the municipality of Adelaide. These works are new, having been formally opened for public use on July 16, 1913. The buildings are constructed along good sanitary lines, concrete and brick being largely used in all structures. The daily slaughtering at present is approximately as follows, but the maximum capacity is considerably in excess of these figures: Cattle, 200; calves, 75; sheep, 2,000; swine, 100.

It is officially reported that the total cost to the city of Adelaide for the acquisition of the site of several hundred acres of land and the construction of stockyards, abattoir buildings, railroad tracks on premises, employees' cottages, etc., was £353,000, or about $1,760,000.

A large meat-export works is maintained and operated by the State of South Australia at Adelaide in which sheep and cattle are slaughtered on account for farmers and stock owners.

The extensive municipal abattoirs at Melbourne were also visited. The weekly slaughter at these abattoirs is about

2,000 cattle and 30,000 sheep during the sheep-killing season. Many of the smaller cities of Australia also own and operate public abattoirs.

ANIMAL DISEASES.

AUSTRALIA.

Considerable losses of cattle have been caused by tick fever, which is similar to if not identical with our tick fever of the southern United States. The carrier of tick fever in Australia is a tick (*Boophilus australis*) which is said to differ slightly from the Texas tick (*Margaropus annulatus*). These ticks now infest only the northern part of Australia, the southern States maintaining a rigid border patrol to prevent the spread of the infestation to those parts of the continent.

Considerable losses of cattle are also sustained in the northern and northeastern parts of the continent from the prevalence of contagious pleuropneumonia. Worm nodules (onchocerciasis) is also quite common in the cattle of northern and northeastern Australia. In this infestation a slender round parasite several inches in length is found in the intermuscular tissues of the living animal, particularly in the region of the brisket and stifle, where nut-sized nodules are formed by the coiling and partial encapsulation of the parasite. The life history of this parasite and its mode of gaining access to the muscular structures of the living animal have not yet been determined. It is not known that any appreciable losses of live animals occur from this infestation, although the presence of the parasite in dressed carcasses causes the rejection for export of considerable quantities of meat, particularly in northern Queensland. Anthrax and blackleg are said to exist in some districts. Tuberculosis is also present in cattle and swine. Blowflies attacking live sheep are particularly troublesome in some districts. Australia is said to be free from sheep and cattle scabies, glanders, foot-and-mouth disease, rinderpest, dourine, etc.

NEW ZEALAND.

Excepting animal tuberculosis New Zealand is remarkably free from many of the communicable diseases that hamper or threaten the production of live stock in most countries.

Of animal diseases said not to exist at the present time in New Zealand are the following: Tick fever, anthrax, cattle scabies, sheep scabies, glanders, hog cholera, contagious pleuropneumonia, worm nodules, rabies, dourine, rinderpest, and foot-and-mouth disease. The live-stock and meat division, department of agriculture, exercises sanitary control of live stock by a system of farm-to-farm inspection, whereby technical and practical advice is given the farmer and Government control assumed if certain infectious or contagious diseases are found to exist.

CORRIEDALE SHEEP—NEW ZEALAND'S NEW BREED.

During the itinerary in New Zealand visits were made to two large sheep-breeding farms in Canterbury. Through the efforts of a few sheep breeders of South Island in careful selection and breeding, a type of crossbred sheep has been produced which in late years has become so fixed in type and character that it is now recognized in Australasia as an established new breed and is officially known as the Corriedale. The foundation stock used in producing the Corriedale has been largely the Merino, Leicester, and Lincoln breeds. The Corriedales combine good fleece production of high-grade wool approaching that of the Merino in spinning merit with desirable mutton qualities of the carcass not possessed by the latter. It appears that the name was applied to the new breed largely on account of experiments in crossbreeding begun by Mr. James Little about 50 years ago on the Corriedale estate in Otago, South Island, but who later removed to Canterbury, South Island, where his experiments were continued. Specimens of Corriedale sheep are seen in Plate XLV.

VETERINARY EDUCATION, GOVERNMENT LABORATORIES, ETC.

Veterinary education is receiving proper recognition in Australia by the well-established colleges of veterinary science in the universities of Melbourne and Sydney. Meat inspection occupies an important place in the curricula of both schools. On September 11, through the courtesy of Prof. H. A. Woodruff, veterinary director, the writer visited the veterinary school of the Melbourne University. This

school is well arranged for classroom, laboratory, and clinical instruction. Two courses of study are provided, one of 4 and one of 4½ years.

On October 22 the veterinary department of the University of Sydney was visited. This school is under the veterinary direction of Prof. J. D. Stewart and is providing a thorough four-year course in veterinary science to its students.

During the investigations in Queensland advantage was taken of an opportunity to visit the State bacteriological laboratory and animal-experiment farm located at Brisbane. From this laboratory blood is supplied for inoculating work in tick fever; pleuropneumonia virus and blackleg vaccine are also supplied, and other investigations relating to animal diseases carried out.

While in New Zealand a visit was paid to the pathological laboratory and experiment farm of the division of live stock and meat, department of agriculture, which is located at Wallaceville, near Wellington, New Zealand. Aside from the routine work in the laboratory of examining specimens forwarded by inspectors, stockmen, and others for diagnosis considerable investigative work in serum therapy, animal tuberculosis, contagious mammitis, feeding, etc., is carried out on the experiment farm which contains about 160 acres.